

CLAIMS

We claim:

1. A method for a graphics arbiter, distinct from a first display source and from a second display source, to notify the first display source of a first estimated time when a future frame will be displayed on a display device, the first display source providing display information to the second display source, the method comprising:
 - notifying the second display source of a second estimated time when a future frame will be displayed on the display device; and
 - notifying the first display source of a first estimated time when a future frame will be displayed on the display device, the first estimated frame time offset from the second estimated frame time, the offset based, at least in part, on an estimated amount of time to be spent by the second display source in processing the display information provided by the first display source.
2. The method of claim 1 wherein the graphics arbiter notifies the second display source in association with receiving an indication of a refresh of the display device and wherein the offset is based, at least in part, on a refresh rate of the display device.
3. A computer-readable medium containing instructions for performing a method for a graphics arbiter, distinct from a first display source and from a second display source, to notify the first display source of a first estimated time when a future frame will be displayed on a display device, the first display source providing display information to the second display source, the method comprising:
 - notifying the second display source of a second estimated time when a future frame will be displayed on the display device; and
 - notifying the first display source of a first estimated time when a future frame will be displayed on the display device, the first estimated frame time offset from the second estimated frame time, the offset based, at least in part, on an estimated amount of time to be spent by the second display source in processing the display information provided by the first display source.

4. A method for an executable to transform first display information provided by a first display source distinct from the executable, the first display source associated with a first display memory surface set, the first display memory surface set distinct from a presentation surface set associated with a display device, the first display source releasing the first display information in the first display memory surface set, a graphics arbiter transferring second display information from an output display memory surface set to the presentation surface set associated with the display device, the method comprising:
- gathering the first display information from the first display memory surface set associated with the first display source;
- transforming the first display information; and
- transferring the transformed display information to the output display memory surface set.
5. The method of claim 4 wherein the executable is in the set: application program, graphics arbiter, and operating system.
6. The method of claim 4 wherein the output display memory surface set is associated with the executable.
7. The method of claim 4 wherein the output display memory surface set is the presentation surface set associated with the display device.
8. The method of claim 4 wherein transforming comprises performing an operation in the set: stretching, texture mapping, lighting, highlighting, translating from a first display format into a second display format, and applying a multi-dimensional transformation.

9. The method of claim 4 further comprising:
- gathering per-pixel alpha information from the first display source; and
 - gathering third display information from a second display memory surface set associated with a second display source;
- wherein transforming comprises using the per-pixel alpha information to merge the first and second display information.
10. A computer-readable medium containing instructions for performing a method for an executable to transform first display information provided by a first display source distinct from the executable, the first display source associated with a first display memory surface set, the first display memory surface set distinct from a presentation surface set associated with a display device, the first display source releasing the first display information in the first display memory surface set, a graphics arbiter transferring second display information from an output display memory surface set to the presentation surface set associated with the display device, the method comprising:
- gathering the first display information from the first display memory surface set associated with the first display source;
 - transforming the first display information; and
 - transferring the transformed display information to the output display memory surface set.
11. An augmented primary surface system for displaying information on a display device, the system comprising:
- a presentation surface set associated with the display device, the presentation surface set comprising a presentation flipping chain and an overlay flipping chain, the presentation flipping chain comprising a primary presentation surface and a presentation back buffer, the overlay flipping chain comprising an overlay primary surface and an overlay back buffer; and
 - a display interface driver for receiving display information from the primary presentation and overlay primary surfaces, merging the received display information, and transferring the merged information to the display device.

12. The system of claim 11 wherein the display interface driver comprises components in the set: software executable, hardware, and firmware executable.
13. The system of claim 11 wherein the display interface driver receives merging information in the set: per-pixel alpha, z-order, and color-key; and uses the received merging information in merging the display information received from the primary presentation and overlay primary surfaces.
14. The system of claim 11 further comprising:
 - a graphics arbiter for transferring display information to the presentation and overlay back buffers.
15. A computer-readable medium containing instructions for providing an augmented primary surface system for displaying information on a display device, the system comprising:
 - a presentation surface set associated with the display device, the presentation surface set comprising a presentation flipping chain and an overlay flipping chain, the presentation flipping chain comprising a primary presentation surface and a presentation back buffer, the overlay flipping chain comprising an overlay primary surface and an overlay back buffer; and
 - a display interface driver for receiving display information from the primary presentation and overlay primary surfaces, merging the received display information, and transferring the merged information to the display device.

16. A method for displaying information on a display device, the method comprising:
- receiving display information from a primary presentation surface of a presentation flipping chain of a presentation surface set associated with the display device;
 - receiving display information from a primary overlay surface of an overlay flipping chain of the presentation surface set;
 - merging the display information received from the primary presentation and primary overlay surfaces; and
 - transferring the merged information to the display device.
17. The method of claim 16 further comprising:
- receiving merging information in the set: per-pixel alpha, z-order, and color-key; and
 - using the received merging information in merging the display information received from the primary presentation and primary overlay surfaces.
18. A computer-readable medium containing instructions for performing a method for displaying information on a display device, the method comprising:
- receiving display information from a primary presentation surface of a presentation flipping chain of a presentation surface set associated with the display device;
 - receiving display information from a primary overlay surface of an overlay flipping chain of the presentation surface set;
 - merging the display information received from the primary presentation and primary overlay surfaces; and
 - transferring the merged information to the display device.